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POPULAR AND ECONOMIC ENTOMOLOGY.

SOME MANITOBAN WATER BEETLES.

BY J. B. WALLIS, WINNIPEG, MAN.

Entomologists in Manitoba have as yet given but little attention to the aquatic Coleoptera, so that our list of these interesting insects is but a short one. Mr. Norman Criddle, of Aweme, has done some work among them, and I, too, have given such time as could be spared—unfortunately all too little—so that our captures comprise practically all the local records. Some seven species of *Haliphila*, fifty of *Dytiscidae*, seven of *Gyrinidae*, seventeen of *Hydrophilidae*, and but two or three of *Parnidae* is but a poor list for a Province containing such a variety of water formations as Manitoba.

A few years ago there was a most charming crescent-shaped slough situated in Elmwood, and only a half mile from my home in Winnipeg. When I first knew it, it was perfectly wild, hardly a house on that side of the river within a mile. To get to it from St. John's, Winnipeg, one had to go by boat across the river or else about four miles round by street-car and then walk a mile.

But it was well worth the journey. On the southeast side of the slough, in the hollow of the crescent, was a rise clad to the water's edge with poplar and oak mixed with many of our prettiest flowering shrubs—Saskatoon plum, hawthorn, tree cranberry and others. What a paradise for the nature-lover it was on a sunny morning in late May! As one strolled quietly through the wood many of our most beautiful birds were sure to be seen or heard. Here a flash of gold and the rich note of a Baltimore Oriole, there the black, white and rose of the Rose-breasted Grosbeak; down among the willows by the water the Myrtle Warblers are busy; in the slough itself the cry of a Grebe or Coot or perhaps the booming of a bittern.

And the water itself! How it reflected every one of Nature's moods. Now frowning as a cloud passes over the sun; now smiling back when the sun smiles down through a rift; now rippling in glee as the gentle breeze kisses it. But more than all, how mysterious it is! As one stands and looks down into its depths, one can understand why the Greeks peopled the water with Naiads. It would not be a very great surprise if a dragon *did* suddenly arise from the cool water and sally forth to find its dinner!

Indeed, though the day of the fiery dragon is long since gone, there are many fearsome beasts below the calm surface, each as terrible in its way as the dragon of St. George. Come and look down through this opening in the weeds. Now see! There is a dragon for you! That creature, about an inch long and a quarter wide, grayish-white in colour, with the huge pair of jaws, is a water tiger, and well deserves his name. No insect or tadpole into which he can sink those jaws is safe from him, and his appetite is similar to Oliver Twist's, except that he always wants more. Some day he will be a big, black, shining beetle. Look again! Do you see that creature on the dead vegetation at the bottom? It moves very very slowly now. Does it not remind you of a cat stalking a mouse? Well, it is stalking something—some tiny creature that is near to it. When within range, an extraordinary "jaw" is suddenly shot out and—our dragon goes off feeling a little more comfortable! By-and-by that ungraceful creature will be a glittering dragon-fly and will charm us with its fairy-like movements and appearance.

It was in that slough that, with a beginner's luck, I took several rare beetles. With an enthusiasm worthy of success I went over to it early in April. It was so cold that the net would stiffen with frost when out of the water and the sheltered parts of the pond were masked with ice. Looking over my records, it is surprising how many are for 13.IV and 15.IV. They include a species of *Laccophilus* to which Mr. C. H. Roberts, of New York, has given a manuscript name, and two specimens of *Hydroporus oblongus* Steph. Of the former I have since taken but one specimen; of the latter, none.

In the first week of May, in the same slough, two more prizes turned up: *Hydroporus rufinasus* Mann and *Agabus clavatus* Lec.

After many, many hours searching *rufinusus* has failed to re-appear, and but two *clavatus* several years apart.

That slough has, alas! now disappeared, and in its stead are long streets of ugly houses.

Another haunt of mine has lost most of its charm from being drained. That is Boundary Creek, not far from Winnipeg Beach. Less than two hours' run from Winnipeg, it was a delightful hunting ground to spend a Saturday at. Early in June it was at its best. In swampy ground near it were clumps of iris, and in shady spots clouds of marsh marigolds. On rising ground to the east were flowering shrubs, oak and poplar, and everywhere some flower or leaf doing its best to be beautiful.

And how insect life abounded! The air was fairly full of dragon-flies—some of them, such as *Leucorrhinia borealis* and *Somatochlora macrotoma*, quite rare ones. Butterflies and a few day-flying moths were hovering over the meadow, while on the surface of the water "striders" were darting here and there and "whirligigs" were madly deserving their name.

It was in the clear, slow moving water of this Creek that I took *Polydotes tortulosus* Robts., and down near the old single plank bridge—now gone—one specimen of a new Gyrinid, to which Mr. Roberts assigned a manuscript name. He had one other specimen, and the two matched exactly. It differs from all other species of *Gyrinus* that I have seen by its shape, which is much longer in proportion to its width than usual; in fact, it looks as if it had been "pinched." Since then I have taken hundreds, and casually examined thousands of this genus in the hope of finding more of my friend, but with no success, nor has search for *tortulosus* been better rewarded.

When hunting for water beetles, a very strong net ring must be used and a short bag of stout cotton or similar material. A good-sized square of cotton on which to dump your catch of mud, leaves and weeds is a necessity, as you can then pick out prizes at your leisure and allow anything not required to escape. Some species are very lively and jump around in vigorous effort to escape; others feign death and do not move for minutes. *Parnids* are often found in rapid-running streams, and the following method suggested to me by Mr. Roberts is a good way of hunting them.

Anchor your dumping cloth across stream in shallow water. Stir up the stones, commencing several yards up and working down. Take your cloth to the bank and pick off your catch as the *Parnids* cling to the surface of the material.

Where to hunt is a difficult matter to suggest. In Winnipeg a number of species, especially *Dytiscus*, come freely to light. Rivers, excepting under stones in rapids and among weeds in back waters, are usually unproductive. Slow moving, weedy creeks or muddy weedy ponds are usually good ground, but one occasionally most unexpectedly comes across species in numbers. Several years ago I had hunted for hours in some water near Selkirk with the poorest of success. Just about giving up in despair, I waded across a shallow bay in which not a weed could be seen. Making a stroke almost without thinking, I brought up my net swarming with a species of *Haliplus* new to me, which turned out to be the rather rare *borealis*. Since then *borealis* has turned up in several places near here, but always in ones or twos. In general, try in shallow water rather than deep, and in warm spots rather than in cool shades.

We have several interesting species of *Haliplidæ* in Manitoba. These include three of Mr. Roberts' new species: *H. subguttatus*, *H. strigatus* and *H. tortulosus*. Two others are *H. borealis* and *H. cribrarius*.

Among our more interesting *Dytiscidæ* is a species of *Laccophilus*, to which Mr. Roberts has given a manuscript name. It is very near *mexicanus* Aubé. Its haunt appears to be muddy sloughs in early spring. Then there is *Deronektes depressus* Fab. = *brevis*, according to Mr. Roberts, which is not uncommon in Sturgeon Creek near here. *Hydroporus vittatus* Lec. is a charming little striped species which, so far as I know, is represented from Manitoba by but one specimen taken in an eddy in Sturgeon Creek. The stream was much swollen by rains, so probably poor little *vittatus* had been swept down from some comfortable marsh. At any rate, it appeared to be alone, as patient dredging failed to secure more.

Our two common species of *Ilybius*, *angustior* Gyll. and *confusus* Aubé are both fairly common at electric light in June, as is

also *Ilybiusoma bifarius* Kby. They are all also taken by dredging in muddy, weedy situations.

So far, I have never succeeded in finding any of our species of *Agabus* at all commonly in their real homes. One spring several species were quite plentiful in ditches connecting with the streams running into the Red River. The water was very high, and apparently beetles which had passed the winter in the river were on their way, together with a number of fish, to find a suitable summer resort. At any rate, many of these slow-running ditches were swarming with beetles. I took several hundreds, most of which went to Mr. Roberts.

Of *Rhantus* we take *notatus* Fab. commonly both at electric light and in muddy ponds; *bistriatus* Bergst. and *tostus* Lec. are much less frequently met with. *Binotatus* Harr. has been taken by Mr. Criddle, who also records *Colymbetes strigatus* Lec. The common *Colymbetes* with me is *sculptilis* Harr., which often swarms at electric light. Mr. Roberts tells me that *rugipennis* Sharp. is a good species, and divided mine for me, but I don't know just on what characters, and my eye is not sufficiently trained at present to detect the differences.

Dytiscus is fairly well represented in Manitoba, as we certainly take six species. *Circumcinctus* Ahr. easily distinguished by the yellow circle around its eyes, is our commonest species, with *sublimbatus* Lec. running it pretty close. Both come to light in thousands. *Fasciventris* Say., *hybridus* Aubé., *dauricus* Gebl. and *harrisii* Kby. are all rather rare, especially the two former. An interesting point about our *dauricus* is that the specimens taken in Winnipeg at light all are small, while several taken at Winnipeg Beach, fifty miles away, are nearly double the size. Possibly the larvæ of Winnipeg specimens live in the Red River and fail to secure sufficient food.

Our rarest *Graphoderes* is *liberus* Say. and *fasciatocollis* Harr. is almost equally so. We take *perplexus* and *elatus* Sharp. more frequently than *fasciatocollis*. I believe Mr. Roberts considers these all good species, and indeed even I could separate them! Our commonest species is *occidentalis* Horn., which comes freely to the lights. It is also by no means uncommon in weedy ponds.

The list of our *Hydrophilidae* is both short and unsatisfactory; the latter because so many species are in doubt. Our two largest species, *Hydrophilus triangularis* Say. and *Hydrocharis obtusatus* Say., are common at light, and the latter is frequently taken by dredging. Two or three species of *Helophorus* and *Hydrochus* may be found in every slough or ditch among weeds or decaying vegetation. Strangely enough, however, I have never taken *Helophorus tuberculatus* Gyll. except on the wing.

Berosus striatus Say., *Philhydrus bifidus* Lec. and *hamiltoni* are all common, one or more of these species appearing in almost every wet situation.

In conclusion, I should like to express my gratitude to Mr. C. H. Roberts, Mr. Chas. Liebeck and Dr. H. C. Fall for the generous and ready assistance they have given me by identifying my material.

THE RE-DISCOVERY OF AGRION INTERROGATUM, SELYS.

BY E. M. WALKER, TORONTO.

In the "Synopsis des Agrionines" (Bull. Acad. Royale Belg. (2) XLI, 1876, p. 1254) Selys described *Agrion interrogatum* from a single female taken in "Saskatchewan, Hudson Bay Territory." The description is a translation from Hagen's manuscript and the type specimen is in the Hagen collection at the Museum of Comparative Zoology, Cambridge, Mass.

Since this description was published, 39 years ago, this species has not been noted, and there seemed but little possibility of its ever being recognized with certainty from the description, as the latter was based upon a single female, the last seven abdominal segments of which were missing.

During a trip to the Pacific Coast, in 1913, I spent two days at Nipigon, Ont., and here I captured a pair *in coitu* of an entirely unfamiliar *Cænagrion* (= *Agrion* Auctt.) and soon afterwards I took another female. These were all I saw of this species until the following year, when I came across it again at Spruce Brook, near the west coast of Newfoundland. They were very scarce and I succeeded in taking only four males in all.

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A comparison of my female specimens with the description of *interrogatum* shows conclusively that they belong to this species, for the description, as far as it goes, is quite detailed, and the colour-pattern distinct enough to be unmistakable. As this description, however, was based upon an imperfect specimen, and as the male was hitherto unknown, I have prepared the following descriptions of both sexes.

Male.—Face, including anterior margin of frons to base of antennæ, greenish; postclypeus and a heavy line at base of labrum black; postocular spots bluish, of moderate size, pyriform or subtriangular, the inner angles acute; a narrow blue occipital margin, which may be interrupted; underside of head black, with a rather broad, yellow, ocular margin; basal part of maxillæ piceous, labium pale yellowish.

Prothorax black, margined in front and behind with bluish, pleura with 3 or 4 irregular blue spots just above the fore-coxæ; hind margin broadly curved or subobtusangulate, moderately elevated except at the median line. Thorax bronze-black with azure blue markings. Antehumeral bands divided into an anterior, stripe and a posterior spot, the former slightly incurved in front, broader in the middle than half the mid-dorsal black stripe, the anterior ends truncate and slightly expanded, posterior ends abruptly rounded; the posterior spot rounded or oblong. Sides of thorax with a blue spot above each coxa and two large blue areas separated at the second suture by a heavy black line which is widened just behind the stigma and again at the upper end. The anterior blue area is partly divided above by a short black line, is excavated antero-ventrally and has three postero-ventral concavities, the middle and upper ones corresponding to the expansions of the black sutural line. Venter pale bluish, the sutures and the space between the middle and posterior legs heavily marked with black, and a heavy black band behind the posterior legs continuous caudad with the stem of a median Y-shaped spot. Legs bronze-black, the inner half of the femora and the outer half of the tibiæ pale greenish.

Abdomen bronze-black, marked with azure-blue, as follows:

Segment 1 blue, dorsum with a transverse black spot occupying the basal third or two-fifths, narrowly continuous on the

sides with a large angular or V-shaped black spot, the anterior limb of which is oblique, the posterior limb transverse. Venter pale with a dark ventral spot, more or less whitish-pruinose.

Segment 2 blue with a very broad oblong black patch on each side, their truncate anterior ends narrowly separated from, or united with, a black spot in the antero-ventral angle, their posterior ends connected across the dorsum, behind middle of segment, by a narrower black band, and prolonged ventro-caudad into a narrow streak which joins the apical transverse black band. Accessory genitalia piceous, the anterior hamuli with pallid margins.

Segment 3 blue; a long black streak on each side, close to the tergal margin, extending cephalad nearly to the base and united behind across dorsum by a basal black band, which is prolonged cephalad on the median line into a slender tapering streak. There is a black spot at the antero-ventral angle and a blue spot close to the postero-ventral angle. Venter black.

Segment 4: The black distal area covers about three-fifths of the segment, separated from the tergal margin by a narrow pale streak and prolonged cephalad on each side into a tapering submarginal streak which nearly reaches base of segment. There is a black dot near the antero-ventral angle and a small blue spot at the postero-ventral angle. Venter black.

Segments 5 and 6 black, the blue reduced to a basal ring occupying two-sevenths (seg. 5) or one-fifth (seg. 6) of the dorsum, and a lateral margin, in which broken indications of a black lateral streak may be present; a black dot at the antero-ventral angle. Venter black.

Segment 7 black with a narrow basal and a broader apical blue ring connected by a rather broad marginal band, which generally encloses an irregular black streak, though the latter may be united with the black of the dorsum.

Segments 8 and 9 blue, each with a black lateral dot; segment 9 also with a pair of black dorsal dots.

Segment 10 black above, blue beneath and on the sides.

Wings—Postcubitals of front-wings 10, sometimes 9; of hind-wing 8, occasionally 9. M_2 in front-wing arising opposite the



1



2



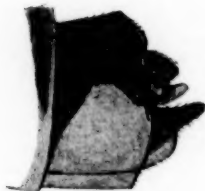
3



4



5



6

CENAGRION INTERROGATUM (SELYS).

fourth postcubital or between the fourth and fifth; the hind-wing between the third and fourth, generally near the fourth; pterostigma covering less than one cell, dark sooty brown with a narrow pale margin.

Appendages—Superior appendages bifid, the upper part short, stout, piceous, separated by a constriction from the lower part, which is somewhat longer and in profile more slender, terminating in a pale tubercle. In dorsal view the upper part has the form of a stout incurved hook, the pale tubercle is continued along the mesial surface nearly to the base and has a slightly concave inner edge bearing a minute sub-basal tubercle. Beneath it the appendage is produced into a slender recurved and incurved hook-like process.

Inferior appendages consisting of an outer piceous and an inner pale portion. The piceous part consists of a broad subtriangular base and a slender apical process directed somewhat upwards, incurved at the tip, and projecting beyond the pale portion, which appears beneath it in profile view, and is mesially concave.

Female—The pale markings of one of the females are blue. of the other salmon-coloured. The former was taken *in coitu* with the single male from the same locality. The colours of the other female had apparently not quite matured and are evidently faded.

The markings of the head and thorax are similar to those of the male with the following slight differences: Postocular spots somewhat larger and rounder, transverse occipital line somewhat broader, pale lateral spots of prothorax slightly larger, tending to merge together; long portion of antehumeral bands straight and not widened in front. In the specimen taken *in coitu* the anterior pale area on the sides of the thorax is divided into two by an extension of the black line which arises at base of front wing. (Pl. V, fig. 4.)

The abdomen is marked as follows:—

Segment 1—Similar to the male, but with transverse dorsal black spot occupying anterior half of segment, lateral spot divided.

Segment 2—A median dorsal black spot, consisting of a narrower anterior part, which is continued cephalad as a narrow line, and a much broader transverse posterior part, connected behind with an apical ring. There is also a black lateral streak, extending the entire length of the segment close to the tergal margin and widened posteriorly.

Segments 3 to 6—Bronze-black above, with a pale basal ring; the black area occupies the dorsal half of the segment and is more or less widened, especially on seg. 3, near the hind margin, where it is narrowly connected with a black submarginal lateral streak extending the entire length of the segment, widening at point of contact with the black dorsal area. A small pale spot is thus enclosed behind this point of contact. The pale basal ring is of about the same width on segments 3 to 5, narrowing somewhat on seg. 6.

Segment 7—Similar, but the pale basal ring still narrower, a very narrow pale apical ring and the lateral streak not quite meeting the dorsal black area except at the apical black ring.

Segment 8—Basal two-thirds to four-fifths black above, apical portion pale, continuous with the pale colour of the sides, in which a long black streak is enclosed.

Segment 9—Basal two-thirds of dorsum with a black subquadrate spot, sides pale with a blackish patch.

Segment 10 and appendages wholly pale.

Sternites of segs. 1 and 2 pale, black-margined; all of the other segments, except apical margin of 8, black. Ovipositor pale.

In one of the females there are 10 postcubitals in each front-wing and 8 in each hind-wing; in the other there are 10 postcubitals in one front-wing, 11 in the other, and 9 in each hind-wing. In both specimens vein M_2 arises just before the fifth postcubital in the front-wings and just before the fourth postcubital in the hind-wings.

Length of body, ♂ 28-30 mm., ♀ 31-33 mm.; abdomen ♂ 22.5-25 mm., ♀ 25-26 mm.; hind-wing, ♂ 16.7-17.8 mm., ♀ 19.5-19.75 mm. The Nipigon male measures about the same as the largest male from Newfoundland, but is distinctly more slender than any of the Newfoundland specimens. A similar difference

is seen in other species of dragonflies and is apparently dependent upon climatic conditions.* There are no other differences worthy of note, except possibly the somewhat shorter interruption of the antehumeral thoracic bands, the posterior spots being more elongate and less rounded.

Selys placed *A. interrogatum* doubtfully as a race of the palaearctic *A. concinnum*, with the following statement concerning its differential characters (l. c., p. 1254).

"1° Les taches postoculaires un peu dentelées en arrière;

"2° Les raies antéhumérales interrompues en point d'exclamation.

"3° La tache basale carrée du 2e segment non prolongée jusqu'au bout, et la bande dorsale des 2e et 3e amincie en avant."

I have not seen *concinnum*, but from a comparison of my specimens of *interrogatum* with Selys' description, I think it improbable that the two forms are conspecific though evidently closely related. In *concinnum* the antehumeral bands are entire, but narrowed above, while in *interrogatum* they are sharply divided, but not narrowed. In the male of *concinnum* the transverse band on segment 2 is described as being connected by a stalk with the apical ring, while in *interrogatum* this connection is not present. Segments 3-5 are described as being black in the apical half, whereas in *interrogatum* the black area includes considerably less than half of segment 3, and more than two-thirds of segment 5. The apical blue area of segment 7 in *interrogatum* is not mentioned in the description of *concinnum* and instead of a black dot on the sides of segments 8 and 9 a black line is described as present. The description of the female does not reveal any differences not noted by Selys.

Hagen compares *interrogatum* with his so-called variety *servum* of *C. resolutum*. This is a form in which the antehumeral bands are divided, resembling an exclamation mark. It is the normal form in Newfoundland, but is hardly worthy of a varietal

*I have discussed this subject as it relates to the genus *Aeshna* in "The North American Dragonflies of the genus *Aeshna*" (Univ. Toronto Studies, Biol. Series, No. 11, pp. 25-29, 1912).

name. *Resolutum* is abundantly distinct from *interrogatum*, but is more closely related to it than is *C. angulatum*, the only other North American species of *Cænagrion*.

These three species of *Cænagrion* may be separated as follows:

- A. Venter of thorax wholly pale; abd. segs. without lateral black streaks close to the tergal margins; seg. 1 without lateral black markings (except a fine transverse line near apical margin).
 - a. Underside of head black, with a broad yellowish ocular margin; without a pale occipital marginal line; seg. 2 in the male with a transverse black spot, not connected with the apical black ring; seg. 8 of female with a pale basal ring *angulatum* Walk.
 - aa. Underside of head yellowish; a pale marginal occipital line; seg. 2 of male with a black dorsal spot connected by a stalk with the apical black ring; seg. 8 of female without a pale basal ring *resolutum* (Selys)
- AA. Venter of thorax with a transverse black band behind the posterior legs, connected with a Y-shaped spot; some of the abd. segs. with black lateral streaks close to the tergal margins; seg. 1 with an oblique or angular black lateral spot..... *interrogatum* (Selys)

The three specimens of *C. interrogatum* from Nipigon, Ont., were taken on June 19, 1913, from a marshy clearing on the shore of the Nipigon River. Three of the Newfoundland specimens were captured on July 27, 1914, in an open marsh at the mouth of a small trout stream emptying into a small lake. The other was taken on July 29 in a small reedy marsh, bordering a small lake, surrounded by dense woods. Both of these lakes are mere expansions of small streams, abounding with brook trout. Dragonflies were exceedingly scarce here, in spite of apparently favorable conditions. This was perhaps due to the great numbers of trout present.

EXPLANATION OF PLATE V.

Cænagrion interrogatum (Selys).

- Fig. 1.—Male, dorsal view. Nipigon, Ont.
Fig. 2.—Male, lateral view. Spruce Brook, Newfoundland.
Fig. 3.—Female, dorsal view. Nipigon, Ont.
Fig. 4.—Female, lateral view. Nipigon, Ont.
Fig. 5.—Male, abdominal appendages, dorsal view. Spruce Brook, Newfoundland.
Fig. 6.—Male abdominal appendages lateral view. Spruce Brook, Newfoundland.

AN INSECT ENEMY OF THE FOUR-LINED LEAF-BUG
(*PÆCILOCAPSUS LINEATUS* FABR.)

BY C. R. CROSBY AND ROBERT MATHESON, ITHACA, N.Y.

On July 26, 1913, while examining some stems of *Weigelia* containing the eggs of the four-lined leaf-bug we discovered that the lower end of many of the eggs had been eaten into and the contents extracted by a small hymenopterous larva. The larva burrows through the pith until it reaches a row of eggs and then

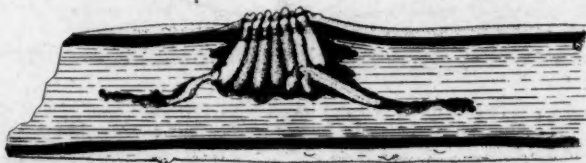


Fig. 14.—Larvæ of *C. ovigonus* attacking eggs of the Four-lined Leaf-bug.

proceeds to destroy them one after another until three or four eggs have been eaten (Fig. 14). Frequently two larvæ may attack the same row of eggs working from opposite ends and thus destroy the entire egg mass. From an examination of a large number of egg masses in this clump of *Weigelia* about 50% were found to be attacked by this parasite.

The larvæ reach maturity before cold weather but do not pupate until the following spring. In order to secure adults we collected a large number of egg masses on February 28, 1914, and found the small larvæ snugly occupying cavities in the pith

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near the eggs. Sometimes the larvæ retreat a short distance from the egg mass burrowing through the pith. These larvæ pupated about a week later and the adults emerged on March 23. This parasite is apparently undescribed. It is a chalcid and belongs to the genus *Cirrospilus*.

***Cirrospilus ovisugosus* sp. nov.**

Female—Length 1.84 mm. Head brown below with a faint bluish-metallic reflection in front and above. Thorax seen from above brilliant iridescent green, blue in certain lights. Prothorax on the sides and the prosternum similar in colour. Abdomen seen from above with metallic greenish reflections, becoming brownish in front, the greater part of the first segment straw colour.

Meso- and metapleura and coxæ dull brown, almost black. Remainder of the legs straw colour, nearly white. Under surface of abdomen brownish, pale at the base, with slight metallic reflections towards the tip.



Fig. 15.—*Cirrospilus ovisugosus*, male.

Antennæ straw-coloured to brownish. Scape slender, pedicel obconic, ring-joint minute. Funicle with three segments, the first the longest, the second and third subequal. Club pointed, indistinctly three-segmented.

Male—Length 1.4 mm. (Fig. 15). Head yellow, eyes and ocelli red. Thorax and legs similar to that of the female.

Abdomen with the first and nearly all of the second segments straw colour, the remainder dark brown with coppery metallic reflections.

Antennæ pale straw colour. The scape greatly enlarged,

narrowed at the base and broadening at the tip. It is about one-third the length of entire antenna. Pedicel obconic, as long as the first segment of the funicle. Ring joint minute. Funicle 4-segmented, the first slightly longer



Fig. 16.—*C. ovisgonus*, larva.

than the others, the second, third and fourth subequal. Club pointed, about one-half as long as the funicle, distinctly 3-segmented when seen in alcoholic specimens.



Fig. 17.—*C. ovisgonus*, pupa.

Larva.—Length 1.7 mm.; white with brownish jaws (See figure 16).

Pupa (newly transformed).—Length 1.5 mm. Colour creamy white. At the base of the abdomen on the dorsal side is a large, oval, orange-coloured area extending on the thorax, apparently caused by the ingested food (Figure 17).

Described from 4 male and 1 female specimens, Ithaca, N.Y., March 23, 1913. Types in Cornell University Collection.

CARNIVOROUS HABITS OF *XYLINA BETHUNEI*; G. AND R.*

BY GEORGE E. SANDERS, B.S.A.,

Field Officer Entomological Branch, Bridgetown, Nova Scotia.

In working with *Xylina bethunei* G. & R. the most common fruit worm or apple worm in Nova Scotia at the Dominion Entomological Laboratory at Bridgetown, N. S., in 1913, it was found that the best place to collect 5th and 6th stage larvæ was in the leaves about the cocoons of *Malacosoma disstria*. On opening a few of these cocoons the pupa contained were in some cases found to be partly eaten. A rough opening having been partly eaten and partly stretched through the cocoon from $\frac{1}{3}$ to $\frac{3}{4}$ of the contained pupa had been devoured. Later on several larvæ were found in the act of eating into the cocoons or devouring the contained pupa. On July 8, 9, 10, 1913, 160 cocoons of *M. disstria* were collected from apple trees near the laboratory and 45 of

*Contribution from the Entomological Branch, Department of Agriculture, Ottawa. June, 1915

them or 28.12% were found to have been eaten into and destroyed by 5th and 6th stage *X. bethunei* larvæ. On July 12 and 13, of 1913, a collection of 201 *M. disstria* cocoons was made and 70 of them or 34.82% were found to be destroyed in the same manner. On July 12, 1913, 75 *Malacosoma americana* cocoons from apple at Deepbrook, N. S., were examined and 7 of them were found to have been destroyed by *X. bethunei* larvæ. In 1913 *X. bethunei* was no further advanced than *M. disstria* and so was a considerable factor in the control of the latter on apple. In 1914 *M. disstria* was almost as numerous as during the previous season, and was greatly retarded by the season, as were apple trees on which it was feeding. *X. bethunei* was not so numerous in 1914 as in 1913, and for some reason was not very much retarded by the season, consequently most of them had pupated before the *M. disstria* larvæ spun up their cocoons so the percentage killed by *X. bethunei* was much less than during the season of 1913. Of 217 cocoons of *M. disstria* collected from apple on July 17, 1914, only 13 or 5.99% were eaten by *X. bethunei*.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Forty-fifth Annual Report of the Entomological Society has just been issued by the Ontario Department of Agriculture, Toronto. The President's address is a valuable contribution to the history of applied entomology in Canada, by Provinces. The insects of the year (1914), both in Ontario and Quebec, are described by several observers, and valuable suggestions are given as to their control. Among the other practical papers presented are those dealing with "The Army Worm in 1914," "Experiments with Poisoned Bait for Locust Control," "An Imported Red Spider Attacking Fruit Trees," and "Control of Forest and Shade Tree Insects of the Farm." The more purely literary contributions comprise a very discerning biographical sketch of the celebrated French entomologist, Jean Henri Fabre, and a chatty article on "Mountains and Hills." The Entomological Record for the year is, as usual, most complete and informing. The many illustrations are a valuable feature of the report, a copy of which will be sent to any entomologist upon application to the Department.—(Press Bulletin, Ont. Dept. of Agriculture.)

THE PUPAL INSTAR OF THE FRUIT-TREE LEAF-ROLLER (*ARCHIPS ARGYROSPILA*¹).

BY GLENN W. HERRICK AND R. W. LEIBY, ITHACA, N. Y.

For the past three years the fruit-tree leaf-roller has been exceedingly abundant in New York State and has caused serious losses to fruit growers. The senior author has given all the time that could be spared from his University duties to the fight against this pest, and during the spring of 1914 it was determined to prosecute the fight on a wider scale, according to plans that naturally grew out of the knowledge that had been gained in past seasons. Accordingly the junior author was established in a field laboratory in Western New York among orchards seriously infested. As a part of the work, it was determined to study certain phases of the life history of the leaf-roller that had not been satisfactorily cleared up before, and one of these points was that of the length of the pupal period. This had become especially desirable in view of the interesting data secured by Davidson in California.² In Bulletin 311 of the Cornell Station, written by the senior author, it was stated that the pupal instar under insectary conditions varied from nine to twelve days. This statement was based on a relatively small number of pupæ, whose actual instars were determined. It seemed desirable to observe a much larger number of the pupæ under as natural conditions as possible in order to obtain a more general average.

Large numbers of the larvæ, nearly full-grown, were placed in jars with an abundance of fresh food. These jars were in an open-air insectary and under normal conditions of temperature. Every morning about the same hour the jars were carefully examined and each newly-transformed larva removed. During the first part of the work each pupa was placed in a separate vial, with muslin over the top, and its record of transformation to the moth kept separate. Later, all of the pupæ gathered on any one morning were placed in a lantern globe, together with some leaves, and muslin was then tied over both ends of the globe. This arrangement gave a clear circulation of air and maintained probably nearly normal conditions of temperature and air drainage. As the moths emerged, each one was removed and the date recorded. The following table shows graphically the results of the study:

1. Contribution from the Department of Entomology at Cornell University.

2. Jr. Ec. Ent., Vol. 6, p. 336.

June, 1915

PUPAL INSTAR OF ARCHIPS ARGYROSPILA.

Number of Specimens	Date of Pupation	Date of Adult Emergence	Length of Instar	Total Days
1	June 10	June 20	10 days	10
4	" 10	" 23	13 "	52
2	" 10	" 24	14 "	28
1	" 10	" 25	15 "	15
1	" 11	" 20	9 "	9
1	" 11	" 21	10 "	10
1	" 11	" 23	12 "	12
5	" 11	" 24	13 "	65
3	" 11	" 25	14 "	42
2	" 11	" 26	15 "	30
1	" 12	" 23	11 "	11
2	" 12	" 26	14 "	28
5	" 13	" 23	10 "	50
3	" 13	" 24	11 "	33
4	" 13	" 25	12 "	48
6	" 13	" 26	13 "	78
5	" 13	" 27	14 "	70
4	" 13	" 28	15 "	60
4	" 14	" 24	10 "	40
4	" 14	" 26	12 "	48
4	" 14	" 27	13 "	52
2	" 14	" 28	14 "	28
3	" 14	" 29	15 "	45
2	" 14	" 30	16 "	32
3	" 15	" 26	11 "	33
8	" 15	" 27	12 "	96
9	" 15	" 28	13 "	117
2	" 15	" 29	14 "	28
2	" 16	" 26	10 "	20
1	" 16	" 27	11 "	11
8	" 16	" 28	12 "	96
9	" 16	" 29	13 "	117
2	" 16	" 30	14 "	28
1	" 16	July 1	15 "	15
1	" 17	June 28	11 "	11
4	" 17	" 29	12 "	48
6	" 17	" 30	13 "	78
3	" 17	July 1	14 "	42
1	" 18	June 27	9 "	9
2	" 18	" 29	11 "	22
4	" 18	" 30	12 "	48
5	" 18	July 1	13 "	65
1	" 18	" 2	14 "	14
1	" 19	June 29	10 "	10
2	" 19	" 30	11 "	22
6	" 19	July 1	12 "	72
3	" 19	" 2	13 "	39
1	" 19	" 3	14 "	14
1	" 20	June 30	10 "	10
1	" 20	July 1	11 "	11
4	" 20	July 2	12 "	48
7	" 20	July 3	13 "	91
2	" 20	" 4	14 "	28
1	" 20	" 5	15 "	15
1	" 21	" 2	11 "	11
3	" 21	" 3	12 "	36
5	" 21	" 4	13 "	65
2	" 21	" 5	14 "	28
1	" 21	" 6	15 "	15
5	" 22	" 4	12 "	60
5	" 22	" 5	13 "	65
1	" 22	" 6	14 "	14
1	" 23	" 3	10 "	10
10	" 23	" 5	12 "	120
9	" 23	" 6	13 "	117
1	" 23	" 7	14 "	14
2	" 23	" 8	15 "	30
1	" 24	" 5	11 "	11
3	" 24	" 6	12 "	36
5	" 24	" 7	13 "	65
1	" 24	" 8	14 "	14
Total				2865
Pupae....227				

Average Length of Pupal Instar, 12.6 days.

It will be seen from the table that 227 pupae were under observation and that the minimum length of the pupal instar was 9 days and the maximum length 16 days, while the average was 12.6 days.

During the first part of the investigation no data were kept on the sexes, but in the later stages of the observations determinations of sex were made in case of the last 155 individuals, of which 70 were females and 85 males. No data, however, were secured on the pupal instars of the two sexes separate from each other. The average of 12.6 days, therefore, is that of males and females combined in probably about the proportions shown by the foregoing figures concerning the last 155 individuals.

The maximum and minimum temperatures, obtained from the Weather Bureau at Rochester, N. Y., are given for each day covering the period of the experiment. Our own maximum and minimum thermometer was evidently placed in a position which did not give the normal temperatures, and we, therefore, took the records of the Rochester Observatory. Rochester is eighteen miles southeast of Hilton, where the field laboratory was situated, and the temperature conditions at the former city would probably fairly represent those obtaining at Hilton, although the altitude of Hilton is 284 feet, while that of Rochester is 523 feet. At any rate, they would be more representative than the temperatures recorded by our own thermometer under the apparently abnormal conditions in which it was placed.

The difference in the length of the pupal instar as recorded in California by Davidson and in New York as shown by the foregoing data is interesting. More data, however, on meteorological conditions in the two regions will be necessary before any very definite conclusions may be drawn.

TEMPERATURES FOR PERIOD OF EXPERIMENT*

June.....	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Maximum.....	84	83	74	73	65	70	62	76	84	75	64	66	70	84	92
Minimum.....	67	63	59	50	52	51	49	44	56	45	41	54	57	64	69
							July 1	2	3	4	5	6	7	8	9
June.....	25	26	27	28	29	30									
Maximum.....	84	79	73	81	64	74	73	71	73	80	79	79	80	85	82
Minimum.....	62	56	58	57	53	52	54	60	58	58	62	61	66	64	65

*From the Records of the Weather Bureau at Rochester, N. Y.

NEW GENERA AND SPECIES OF TINEINA.

BY ANNETTE F. BRAUN, CINCINNATI, O.

Several species of Tineid moths in the writer's collection belonging to genera apparently new are of considerable interest because of their phylogenetic significance or because they show relationship to isolated genera or groups of genera. The present paper includes the description of these genera, together with descriptions of a number of new species recently bred. The types are in the writer's collection.

Corythophora, new genus.

Face smooth; head elongate, with an erect tuft between the antennæ. Antennæ 4/5, basal segment enlarged and concave beneath to form an eye-cap, with pointed projecting flap of scales anteriorly. Labial palpi moderate, drooping, smooth-scaled. Maxillary palpi rudimentary.



Fig. 18.—Venation of *Corythophora aurea*.

First segment of anterior tarsi thickened with scales; posterior tibiae hairy.

Fore wings elongate ovate, costa thickened for two-thirds its length; 1b simple, 3 absent, 6 and 7 connate, 9 and 10 arising near costa, 11 absent; transverse

vein absent between 2 and 9. Hind wings $\frac{2}{3}$, narrow, lanceolate, cilia 4; 3 absent, 5 and 6 stalked, transverse vein absent between 4 and 5. (Fig. 18).

Type—*Corythophora aurea*.

The relationship of this genus to *Leucoptera* Hb., *Crobylophora* Meyr., and *Proleucoptera* Busck., is suggested at once by the general appearance of the insect, and a study of all the characters substantiates this view. It is a much earlier form and undoubtedly indicates the stem from which the genera of this group have sprung.

June, 1915

although the genus in its present form has acquired a number of specialized characters.

The neurulation of the fore wings in the three genera just mentioned can easily be derived from that of *Corythophora*. The absence of vein 11 is not significant, but is of recent disappearance, as it is virtually absent in one species of *Proleuoptera* while present in the other, and thus can not be considered as a character of importance. However, the fact that vein 4 is here present and occupying its normal position would suggest that a slightly different interpretation should be put upon the venation of *Proleuoptera*, viz., that vein 3 is absent and not 4, as stated by Mr. Busck in his characterization of that genus.

The derivation of the neurulation of the hind wings of the younger genera from this type is not so obvious. However, the examination of the hind wing of *Proleuoptera smilaciella* Bsk. discloses a feature hitherto overlooked, which shows clearly its origin from the present genus. As shown in the accompanying figure (Fig. 2), veins 5 and 6 are stalked from the base and distinctly separate from 7 toward base, but almost anastomose with it along the middle of the wing, becoming separate again where they branch.

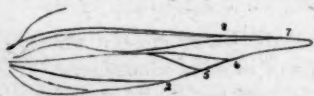


Fig. 10.—Hind wing of *Proleuoptera smilaciella*

Its affinities with Tineid stock are at once apparent; in fact, its neurulation closely approaches that of some of the Tineid genera. This furnishes strong confirmatory evidence of the descent of this group from the Tineidæ, from which it has been regarded as derived.

***Corythophora aurea*, n. sp.**

Head and appendages very pale yellow, flap of scales on basal segment of antennæ somewhat deeper yellow.

Thorax pale yellow or white, patagia golden yellow. Fore wings golden yellow, deepening toward the apex, where the colour is deep orange. Costal margin from 1/5 to just beyond the beginning of the cilia, and dorsal portion of the wing below the fold, pale yellow, fading almost to white on the extreme margins.

Legs pale yellowish white, except the anterior tibiae and tarsi, which are dark brown externally.

Expanse: 9-9.5 mm.

Two males, Cincinnati, O., July 13, and Balsam, N. C., July 22.

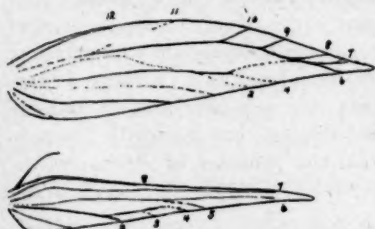


Fig. 20.—Venation of *Apophthisis pullata*

The erect tuft and position of the antennal flaps which project obliquely forward in the dead insect give this species a very striking appearance.

Apophthisis, new genus.

Head with appressed scales, antennae somewhat under 1, basal segment with

pecten. Labial palpi moderate, straight, drooping. Maxillary palpi rudimentary.

Posterior tibiae with a row of short projecting scales above.

Fore wings lanceolate, the margin from the inner angle to the apex is almost straight or slightly concave; 2 almost obsolete, 3 absent, 4 indistinct, from lower angle of the cell, 5 absent, 6 and 7* stalked, transverse vein indistinct between 4 and 6. 11 obsolete except at origin and near costa. Hind wings about $\frac{1}{2}$, lanceolate, cilia 5; 5 and 6 stalked. (Fig. 20).

Type: *Apophthisis pullata*.

A very peculiar genus, apparently most closely allied to *Stomphastis* Meyr., with which it agrees in some characters. The loss of vein 5 of the fore wings is a feature not found elsewhere in the *Gracilariadæ*, where modification usually results in the loss of vein 6.

In any group it is possible within certain limits to determine which veins are absent, if the primitive type of colour pattern is known. Elsewhere† it was shown that the tips of veins mark the extremities of unpigmented (white) fasciæ, separating the primitive transverse bands of colour. Thus, in *Lithocolletis*, the primitive colour pattern consists of a series of seven transverse bands, separ-

*In the specimen denuded, 7 is branched near the costa, as shown in the figure; this is probably an individual abnormality.

†Braun. Evolution of the colour Pattern in the Microlepidopterous Genus *Lithocolletis*, Jn. Acad. Nat. Sci. Phila., XVI, 105-167, 1914.

ated from one another by white fasciæ. The last of these bands crosses the tip of the wing. The costal extremity of the white fascia preceding it lies over the tip of vein 7, but there is no vein at its extremity on the termen. The extremities of the sixth band lie between veins 7 and 9 on the costa, and just beyond vein 5 on the termen. The white fascia preceding this band lies over the tip of 9 on the costa, and over the tip of 5 on the termen. This general type of colour pattern may be regarded as primitive not only for *Lithocolletis* alone, but for the entire family *Gracilariadæ*. In more ancestral forms, where all the veins are present, the tip of vein 6 occupies the position marked by the extremity of the last white fascia, that is it is almost opposite the tip of vein 7. This must be regarded as the normal position for vein 6 in this group. Therefore, in *Lithocolletis*, where no vein is present at the extremity of this fascia on the termen, we must regard vein 6 as the vein which is absent, as has been done in the more recent literature on the group.

In *Apophthisis*, the last vein to reach the termen before the apex occupies the normal position of vein 6. For this reason, vein 5 has been here regarded absent, in a group where it is, with this exception, uniformly present.

***Apophthisis pullata*, n. sp.**

Head and palpi gray, antennæ gray with paler annulations. Fore wings clothed with sordid grayish white, fuscous-tipped scales, giving the wing in general a speckled gray appearance. An indistinct black streak in the fold from near base to one-third, a second shorter streak in the fold beyond it. The scales around the apex form an indistinct line in the gray cilia. Hind wings gray.

Legs gray; tibiæ tipped with white; tarsi annulate with white. Expanse: 5.5-6 mm.

Two specimens, both males, near Cincinnati, O. The larva is a miner in leaves of buckthorn (*Rhamnus lanceolata* Pursh.) The mine lies deep in the leaf substance; linear at first, gradually broadening into an irregular blotch, 5 or 6 mm. wide, and occupying about one-fourth of the area of the leaf. The leaf retains its green colour, so that the mine is not plainly visible during the

early stages; in the later portions of the blotch, the substance of the leaf is consumed, rendering the mine distinct. Pupa outside the mine in broadly oval, flat, yellow cocoon spun in a fold of the leaf or in a crevice.

There are two generations a year. Mines may be found in early July and in October. The two imagos in my collection appeared July 25 and May 1 respectively.

The position of the imago at rest reminds one of a small species of *Ornix*.

***Marmara auratella*, n. sp.**

Head and thorax dark brown, with a distinct bronzy lustre; face metallic gray. Labial palpi bronzy, third segment with the apical half whitish. Maxillary palpi with the last segment pale. Antennæ dark brown.

Fore wings bronzy brown, with an almost golden lustre under brilliant illumination. The markings are brilliant silvery white and are situated as follows: At the basal fourth a fascia nearly straight on its inner margin, but broadening outwardly below the fold; at the middle of the wing a somewhat oblique costal streak, and nearly opposite it, but a little farther back on the dorsal margin, an erect dorsal streak; at the apical third a triangular costal streak almost meeting the apex of a similar dorsal streak; just before the tip a narrow costal streak, nearly crossing the wing. Cilia dark brown, shining white opposite the apex. Hind wings dark brownish gray, cilia concolorous.

Legs dark brown, with broad silvery annulations. Abdomen beneath with segments silvery posteriorly.

Expanse: 6.5 mm.

Two specimens, Cincinnati, O., bred from long serpentine mines on stems of the cultivated form of *Rudbeckia laciniata* L., the "Golden Glow" of gardens. I have searched for the mines on the stems of the wild plants, both here and elsewhere, without success. The mine, which is very similar to that of *Marmara salicella* on willow, is usually situated toward the lower part of the stem. The larva mines just beneath the epidermis usually working downwards, although the mine crosses on itself many times.

At the time of pupation the larva departs widely from the well-known habits of all the other species of the genus. Previous to this time the mine has been placed just beneath the epidermis. At maturity the larva cuts through the epidermis and two layers of bark beneath it around the end of the mine and for a distance of 3 or 4 mm. on each side. This elongate flap of tissue which hangs with its free end downward is then bent into a fold which causes it to project beyond the contour of the stem. The cocoon is spun on the under side of the flap, so that its lower surface is visible if the flap is lifted up. At the anterior end of the cocoon a slit is cut in the lower layer of loosened bark and through this opening a passage lined with silk leads to the exterior, so that at emergence the pupa is thrust out between the two layers of loosened bark at the lower end of the flap. The pearly globules, so characteristic of the cocoons of the other species of the genus, are entirely absent in this instance. In other respects this species agrees with the characteristics of the genus.

There are two generations a year. The larvæ of the first generation pupate toward the end of July and produce imago in early August. The larvæ of the second generation pupate in October, but the imago do not appear until the first of the following June.

The imago is nearest to *M. arbutiella* Bsk.

***Marmara apocynella*, n. sp.**

Head whitish on face, becoming distinctly yellowish on the vertex, with some fuscous scales behind. Palpi whitish, the second segment of the labial palpi tipped with black. Antennæ gray.

Fore wings black; a straight white fascia at basal fourth; an oblique fascia at the middle, a little angulated near the dorsum; at two-thirds, a triangular costal spot and opposite it a small inconspicuous dorsal spot; a white costal streak before the apex. Cilia white opposite the apex, elsewhere gray. Hind wings and cilia gray, tinged with yellow.

Legs black, annulate with white; first tarsal segment black with a white tip, remaining segments pure white with an occasional black spot near the tip. Abdomen black above, grayish beneath.

Expanse: 5 mm.

One specimen, bred from a long whitish serpentine mine on the stem of dogbane (*Apocynum cannabinum* L.). The larva leaves the mine to pupate, and spins the characteristic white cocoon ornamented with pearly globules. Mine collected near Cincinnati, July 3, at which time the larva was nearly full grown. Imago, July 21.

This species comes very close to *Marmara salictella* Clem., from which it may be distinguished by the yellow head, more oblique median fascia and smaller size.

Cystiæcetes, new genus.

Head with appressed scales; ocelli present; tongue developed. Antennæ $\frac{2}{3}$, outer half very shortly bipectinate and ciliate in both sexes, basal segment rather long, without pecten. Labial palpi long, recurved, second segment thickened with scales, terminal segment shorter, thickened with scales, apex acute. Maxillary palpi very short, appressed to tongue.

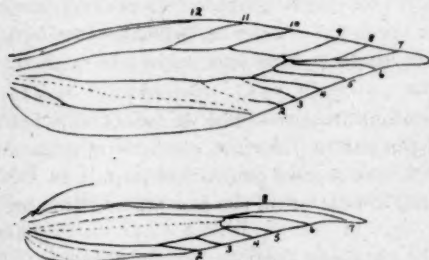


Fig. 21.—Venation of *Cystiæcetes nimbosus*.

Posterior tibiae rough-haired above on the posterior half.

Fore wings with large tufts of raised scales; 1b furcate, 2 from three-fourths of cell, tubular only near the margin, 4 from angle, 6 out of base of stalk of 7+8, 11 from middle of cell. Hind wings $\frac{2}{5}$, narrow lanceolate, cilia 5; 2-4 nearly parallel, 4 and 5 connate, 5 and 6 parallel, 6 and 7 approximated at base. (Fig. 21).

Type: *Cystiæcetes nimbosus*.

This genus is closely related to *Chrysopeleia* Cham., which it very closely resembles in type of markings; the antennal and palpal characters are identical. In *Chrysopeleia* vein 2 of the fore wings is absent, and 6 is out of 7 beyond 8; the venation of the hind wings differs only in the stalking of 6 and 7. It appears to bear some resemblance to some Australian genera in antennal structure and in neuration of the hind wings.

Cystioecetes nimbosus, n. sp.

Head gray; scales on the under surface of the palpi becoming white-tipped towards the ends of the segments. Antennæ dark gray. Fore wings gray, microscopically speckled with whitish. Scale tufts almost black, the scales composing them tipped with white; a large tuft below fold at basal third, another below the middle of the costa; a smaller tuft on the dorsum a little behind the middle; a fourth small tuft at end of cell; two very small tufts on termen before apex. Hind wings and cilia gray.

Legs dark gray, tips of segments whitish.

Expanse: 10.5-12 mm.

Thirteen specimens, Mills College, Alameda Co., Cal., and Camp Baldy, San Bernardino Co., Cal., bred from larvæ on "Cas-cara" (*Rhamnus purshiana* DC.), an evergreen, and also on a similar deciduous species of *Rhamnus*.

The larva feeds within a large inflated gall-like chamber



Fig. 22.—Larval dwelling of
Cystioecetes nimbosus.

above, just below the margins of the leaf, and near each end. The leaf bulges between the lateral veins forming a series of pouches projecting from the large elongate chamber. (Fig. 22). The

larva is pale grayish brown, with head and prothoracic shield shining pale brown. A small silken cocoon is spun, often just outside the larval habitation, where the sides of the leaf diverge, or between leaves on the bottom of the breeding jar.

Antispila aurirubra, n. sp.

Head and palpi bronzy; antennæ dark brown. Thorax and fore wings very lustrous, colour varying, according to the direction of light from greenish golden to a brilliant reddish bronze. The latter colour predominates near the base and along the termen and around the apex of the wing. At one-third a narrow pale golden fascia, somewhat nearer base on the dorsum; at two-thirds a triangular costal spot, and a little nearer the base on the dorsum a similar dorsal spot, with its apex produced and pointing obliquely toward the middle of the costa. Cilia dark gray. Hind wings dark gray, purple toward the apex, with golden brown cilia.

Legs bronzy brown, hind tarsi tipped with pale yellow.

Expanse: 7-8 mm.

Two specimens, Fredalba, San Bernardino Co., Cal. Larva in brownish blotches in leaves of a species of *Cornus*. The completed case appears somewhat truncate at each end. Mines received, August 6; imagos emerged May 21 and 25.

More closely allied to *A. nyssæfoliella* than to any other species, but the more reddish colour and the more slender fascia will separate the two species.

Obrussa, new genus.

Head and face tufted. Antennæ $2\frac{2}{3}$, simple in ♂, basal segment enlarged and concave beneath to form an eye-cap. Labial palpi well developed, porrected. Maxillary palpi long, filliform, folded. Tongue rudimentary.

Posterior tibiae with spines above; middle spurs above the middle of the tibiae.

Fore wings elongate ovate; 1b simple at base, 2 becoming obsolete shortly beyond transverse vein, which closes the cell before the middle of the wing, 3 and 4 absent, 5 and 6 stalked, the stalk out of 8, 7 to costa out of 8, 9 absent. Hind wings a little over $\frac{1}{2}$, cilia $2\frac{1}{2}$; 1c faintly visible, 3 and 4 absent, 6 absent, 5 and 7 stalked from before middle, cell open between 2 and 5. Frenulum of many spines. (Fig. 23).

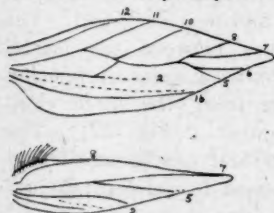


Fig. 23.—Venation of *Obrussa ochrifasciella*.

Type: *Obrussa ochrifasciella* Chambers (Can. Ent., V, 128, 1873.).

The genus seems to approach *Ectademia* Bsk. more closely than any of the other allied genera; from *Ectademia* it differs chiefly in the presence of vein 5 of the fore wings and in the position of the spurs of the hind tibiae, which are situated above instead of below the middle. *Obrussa* is relatively somewhat shorter and broader winged than either *Ectademia* or *Nepticula*.

In describing *Nepticula ochrifasciella*, Chambers probably had before him males only, which are uniformly smaller than females. and alone show the distinct ochreous under surface of the basal

half of the fore wings. A fuller description embracing both sexes is here given:

Palpi pale ochreous. Tuft on face and head reddish ochreous. Antennæ fuscous, eye-caps ochreous.

Thorax and basal third of the fore wings black, apical two-thirds tinged with brown. A broad pale ochreous fascia crosses the wing at the basal third. From base to outer edge of fascia on costa, and nearly to tornus on dorsum, the under side of the wing in the ♂ is ochreous; in the ♀, this area though paler is not definitely outlined. At two-thirds are some scattered paler scales, sometimes (in ♀) forming an indistinct line across the wing. Cilia around the apex and last row of scales at the extreme apex pale ochreous. Cilia elsewhere concolorous with the wing. Hind wings gray, cilia concolorous.

Legs dull ochreous, mixed with fuscous; outer surface of fore and middle tibiae and tarsi dark brown.

Expanse: 6.5 mm. (♂); 7-8 mm. (♀).

I have always found this species resting on leaves of saplings in dense woods with sparse undergrowth. The specimens in my collection were taken May 30 to July 6; a single specimen is dated August 5. I have thus far no clue to its life history.

BOOK REVIEWS.

THE HOUSE-FLY. ITS STRUCTURE, HABITS, DEVELOPMENT, RELATION TO DISEASE AND CONTROL. By C. Gordon Hewitt, D.Sc., F.R.S.C., Dominion Entomologist, 382 pp., 105 figs., Cambridge, at the University Press, 1914. Price 15 shillings net.

It is unusual to find a book dealing with as wide variety of subjects as this one, that does not show some inequality of treatment when carefully analyzed. The author generally reveals the fact that he is more at home in some branches of the subject than in others. Of Dr. Hewitt's book this cannot be said. Whether he discusses questions of minute anatomy or parasitology, bacteriology or the practical problems concerned with public health, he shows a thoroughness of grasp and a clearness of diction only possessed by the master.

The present work is an outgrowth of Dr. Hewitt's admirable monograph on the House-fly, which first appeared in three parts

in the Quarterly Journal of Microscopical Science in 1907, 1908 and 1909, and was republished in book form, together with several appendices in 1910 by the Manchester University Press. This edition was very limited and was soon exhausted, and as much new material had been brought to light by subsequent investigators in various countries, the author deemed it necessary to prepare a completely new work, bringing the subject matter thoroughly up to date.

The book is divided into six parts as follows: Part 1—The Structure and Habits of the House-fly. Part 2—The Breeding Habits, Life History and Structure of the Larva. Part 3—The Natural Enemies and Parasites of the House-fly. Part 4—Other Species of Flies frequenting Houses. Part 5—The Relation of House-flies to Disease. Part 6—Control Measures.

Of the 27 chapters, those dealing with structural matters are but slightly modified from the author's original accounts of these subjects. All the others contain a large quantity of information not found in the earlier work. This is especially true of Part 5, in which six chapters are included, an entire chapter being devoted to "the carriage of typhoid fever by flies," and another to "the relation of flies to summer diarrhoea of infants." In these and the other chapters of Part 5 the enormous literature dealing with experimental investigations in the dissemination of bacterial diseases and parasitic worms by flies is very carefully and concisely summarized and will prove of great interest and value to physicians and public health-officers.

Following Part 6 is a bibliography of 36 pages and two indices, an author's and a subject index.

This book will undoubtedly remain the chief source of information on the house-fly for many years to come and will rank as a classic for all time.

CANADIAN INSTITUTE: GENERAL INDEX TO PUBLICATIONS, 1852-1912. Compiled and edited by John Patterson, M.A. Honorary Secretary. University Press, Toronto, 1914. Price \$5.00.

Students of all branches of Science, Literature and Art throughout Canada owe a debt of gratitude to Mr. and Mrs. Patterson for having undertaken and completed in such admirable fashion the arduous task of indexing the long series of publications of the Canadian Institute, from 1852 to 1912, including all the volumes published by the Institute before it received the title of "Royal."

The publications of the Canadian Institute have appeared in four principal series: The Canadian Journal (1852-1855) The Canadian Journal of Science, Literature and History (new series) (1856-1878); The Proceedings of the Canadian Institute (1879-1890) and the Transactions of the Canadian Institute (1890-1912); and one minor series, The Proceedings of the Canadian Institute (new series) (1892-1904). The last has not been included in the general index, but a list of the papers under authors is given in an appendix.

These volumes contain a vast amount of information on almost all subjects relating to Canada and a general index has been hitherto much needed. The present work satisfies this need most completely, being the contents of every paper dealt with in a thorough and detailed manner. The principal entries are in bold-faced type, and indented under these are the entries of subordinate topics. For instance, Ontario appears in bold-faced type and under it are more than three pages of entries of subjects relating to the Province. Similarly we find references to genera of animals and plants in bold-faced type, followed by species in ordinary type. Cross references are necessarily frequent, but have been avoided as far as possible.

This work will be of considerable value to entomologists in Canada. During the first years of the Institute's history, when there were few magazines dealing with special branches of science, the Canadian Journal formed one of the chief means by which papers on such subjects could be published; hence we find quite a number of articles on botany, entomology, ornithology, etc., in the earlier volumes. These are at least of historic value and contain many records of importance to the faunistic student. By means of this excellent index they are readily accessible, and there will now be no excuse for their being ignored or overlooked by modern workers, as has sometimes been done in the past.

FOREST INSECTS OF SWEDEN.

Sveriges Skogsinsekter. By Ivar Trägårdh. VIII, 279 pp. 16 pls., 136 text figs. (Stockholm: Hugo Gebers.) 1914.

The comparative similarity of the forest conditions of Canada to those of Sweden gives this book a special interest to Canadian

entomologists. A number of forest insects are common to both countries. Our great regret is that, being written in the Swedish language, its contents will not be accessible to all who would wish to study it with care. The latter desire and the nature of its contents may, however, induce some to add another language to their vocabulary, for the excellence of its treatment would almost warrant such a venture.

After preliminary chapters on the characters and organization of insects, their development, and the general methods of control, the author takes the different orders, commencing with the Coleoptera, and describes those families and their members that are injurious to the forests, or useful as parasitic or predaceous enemies of forest insects. His treatment is somewhat along similar lines to that of Taschenberg in his "Praktische Insektenkunde." In the longest chapter, namely, the Coleoptera (Skalbagga), the following families are dealt with: Carabidæ, Staphylinidæ, Silphidæ, Histeridæ, Cantharidæ, Cleridæ, Elateridæ, Buprestidæ, Lymexylonidæ, Anobiidæ, Coccinellidæ, Cerambycidæ, Phytophaga, Curculionidæ, and Ipidæ, the last, of course, is treated the most extensively. The chief injurious species (or useful species as the case may be) in each family are considered individually and a description sufficient to enable the insect to be identified is given; the larvæ, habits and methods of control are also described in most cases. The excellent series of illustrations, largely original photographs, constitute a valuable feature of the volume. Where the insects are of serious importance, special attention is devoted to them, for example, the Nun Moth, *Lymantria monacha* L, whose introduction may we be spared, is given eleven pages; the Gipsy Moth hardly receives two pages!

A special chapter is devoted to gall-making insects and *Eriophyes*, and after a useful chapter on control measures, the book concludes with a table giving keys to the various insects according to the trees and parts of the trees they attack. We cannot say more than that we wish we had a similar work on our own forest insects. Perhaps the author will make his book more accessible to English-speaking readers by translating it some day, a task of which we know he is capable.

C. G. H.

Mailed June 4th, 1915

